

Revision

UNIT (1): LIVING SYSTEMS

Concept (1): Adaptation and survival

Concept (2): Senses at work

Concept (3): Light and Sight

Concept (4): Communication and information transfer

By: Amany Mahmoud Ghanem



Concept (1): Adaptation & Survival

1- **Adaptation:** It's a characteristic of living organisms that allows them to change over generations and helps them to survive and reproduce in the ecosystem.

2- **Types of adaptation:**

*Structural adaptation: a change in the structure of animal's body to adapt its environment.

*Behavioral adaptation: a change in the behaviors(acts) of a group of animals to adapt its environment.

3-

Animal	Habitat	Structural adaptation	Behavioral adaptation
Penguin	Antarctica	-insulating fat layer and thick downy feathers. -in it's feet warm blood vessels wave around cold blood vessels to keep feet warm.	
Polar bear	Arctic region	-It has white and thick fur helps it to blend in with snow and stay warm.	
Brown bear	Forests	-It has brown thick fur to stay hidden among the trees.	
Fennec fox	Desert	-It has tan-colored coat provides camouflage and protection from hot sun. -Extra-large ears to stay cool -special shape of ears allow excellent hearing.	-Pants like doges (700 breath by minute) to cool its body. -lives in burrows. -eat different kind of food.
Arctic fox	Tundra	-It has thick fur coat to keep its body warm. -Fur coat white in winter & brown in summer to blend in with surrounding. -short ears and legs. -special shape of ears that allow excellent hearing.	-lives in burrows to stay warm. - eats different kind of food.

Bull shark	Fresh and salt water	-Can live in both fresh and salt water. -has dark back and white belly "Countershading" → camouflage strategy. -has sharp teeth.	-Can hunt in different places. -hunt in days as well as night.
Starred agama lizard	Desert	-has colorful scales that make them hard to be seen among rocks.	-live in burrows to keep cool during hot days.
Panther chameleon	Tropical rainforests	-has brightly colored scales. -its eyes move in different directions. -has very long sticky tongue. -has V-shaped feet and tail like a hand.	When attackers attack : -It puffs up its body with air. -It opens its mouth wide. -It changes the colors of its scales.
Caracal	Desert	-has sandy colored fur to blend in with desert land scape.	

4- Plants adaptation:

Savannah forest	Amazon forest
<ul style="list-style-type: none"> - In southern Africa. - Grassland habitat. - Mild temperature. - Extreme lack of water. - Characterized by drought conditions. - large tree (Acacia tree) 	<ul style="list-style-type: none"> - In Brazil. - Easy to find water. - Hard for plants to reach sunlight. - Has soggy soil = wet muddy soil. - Characterized by strong winds. - trees up to 70 meters tall. - Kapok tree

Plant	Habitat	Structural adaptation	Behavioral adaptation
Acacia tree	Savannah forest	<ul style="list-style-type: none"> - Root: "Has very long root grown deeply in the ground (35 m)" - Trunk: "Very long trunk to prevent animals reach it and to store water in it". - Leaves: "Tiny leaves to hold it water- have sharp spines to protect it." 	<ul style="list-style-type: none"> - Can defend itself when animals begin eating the leave it produces a poison make the test very bad. - send a smelly message in the wind to trees nearby telling them to start making poison.

Kapok tree	Amazon rainforest	- Root: *Has large, wide roots called buttress roots. *grow near the soggy soil not deeply in the ground. * some roots start up to 5 meters above the ground. -Leaves: "Has hand shaped leaves with narrow parts that allow wind to move gently through them."	- It uses the wind to send smelly messages to invite bats to come visit its delicious- smelly flowers
Mangrove tree	Salt water	Has long and strong roots to resist the waves.	
Water lily	Wetland	Has wide leaves to absorb a big amount of sunlight.	
Palm tree	desert	Has thick roots and small leaves to resist the strong winds.	
Pine tree	snow	-has triangular shape and short branches to allow the snow to slide easily over it, so its branches don't break. -has needle leaves to prevent the plant from losing water.	
Barbary fig	desert	Has sharp spines to prevent the animals from eating its leaves and fruits.	

5- Digestive system: [Found in the abdominal cavity]

It's the system responsible for breaking down food into small parts to enable cells to use it in getting energy.

-It structure: 1. Digestive canal: (Mouth opening - Esophagus - Stomach - Small intestine - large intestine - Anus opening)

2. Digestion canal supplementary: (salivary glands - liver - pancreas)

6- Digestion process: It's a process of breaking down food and changing it into chemical substances that the body absorbs and uses them in getting energy and growth.

In Cell: digested food + O₂ ----> Energy + CO₂



7- Cows digested system is long and its stomach consists of 4 parts, because they eat grass which is very difficult to be digested.

*Cows have flat teeth: suitable for eating grass.

8- Dogs have short digested system and small stomach, because they eat meat which is much easier to be digested.

*Dogs have sharp teeth: suitable for eating meat.

9- **Respiratory system** for humans: system responsible for breathing.

10- **Breathing (Respiration process)**: It's a process of entering the air carrying oxygen into the body and pushing the air carrying carbon dioxide out of the body.

* **It's structure**: (Nasal cavity - pharynx - trachea - two lungs - diaphragm)

11- Inhalation & Exhalation:

	Inhalation	Exhalation
The way air take	Air rich in O_2 → nasal cavity → trachea → two bronchioles → alveoli → blood → cell	Air rich in CO_2 → Cell → blood → alveoli → two bronchioles → trachea → nasal cavity → out of the body
Lungs	Enlarge	Becomes narrow
Diaphragm	Contracts and move downwards	Relaxes and move upward
Size of chest	Increases	Decreases
Type of air	O_2 enters the body	CO_2 Expellees out of the body

12- Fish breath through gills. Gills extract O_2 from water and releases CO_2 in water.

13- **Types of environmental (ecosystem) changes**:

Changes caused by nature itself	Changes caused by human activity
<ul style="list-style-type: none"> - Changing in temperature. - The amount of rainfall from seasons. - severe weather events, such as winds. - Wildfires and floods 	<ul style="list-style-type: none"> - Cutting down forests. - plowing grasslands. - introducing plants, animals and diseases that were never part of the ecosystem. - air , water & soil pollution.

14- The role of humans to help restore ecosystem:

- Replanting the cleared forests.
- Removing the pollutants of air and water.
- Preserving plants and animals in these ecosystem.



- 15- **Amphibians:** They are small animals such as: (Frogs - Toads - Salamanders) and they are endangered animals.
- 16- Adult amphibians can breathe through lungs (from air) and its skin also (from water)
- 17- We have to keep air, water and soil clear, in order to protect living organisms from extinction.

Concept (2): Senses at work



1-Living organisms adapt to their environment through their **sharp (super) senses**.

2-**Nocturnal animals**: They are animals look for their prey at night using their super senses.

Animal	Super Sense	Purpose
Dolphin	Hearing	Using Echolocation for searching for food and protect itself under water
Bats	Hearing	Using Echolocation for searching for food at night.
Snakes	Ability to sense heat	For searching their prey at night.
Owls	Sight & hearing	For searching their prey at night.
Egyptian Jerboa	Hearing	For hearing its predator (snakes) and jumping away from them.
Fox	Hearing & sight	Avoiding danger
Chameleon	Sight & taste	Searching for food.
Dogs	Smell & sight	Recognizing friends.
Monkey	all	Identifying things.

3- **The Nervous system**: It's the system responsible for gathering **جميع** information from the surrounding and processing it to Keep the human body safe.

4- **The nervous system consists of**: - Brain: main control center of the body.

-Spinal cord: carries messages from Nerves to brain and vise verse.

-Nervous: carry messages from spinal cord to body and vise verse.

5- **Sensory receptors**: Nerves found in the body to receive information from the surrounding.

6- **Electrical impulse**: it's the messages which carry the information form and to the brain through nerves

7- **Reaction time**: It's the time taken by an organism's body to react to stimuli around it.

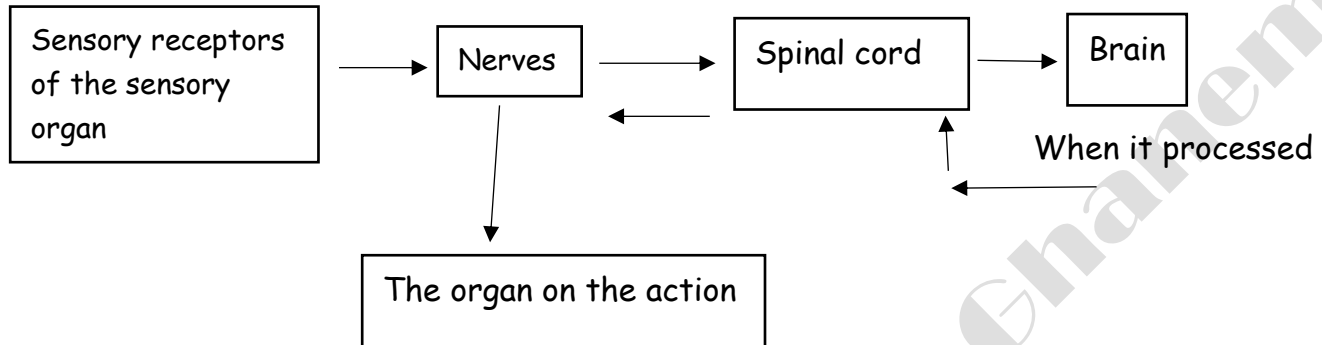
8- **Function of the Nervous System**:

*Collecting Information about what happens inside and outside the body then sends it to the brain.

*Understanding what this information means.

*According to this information, a signal is sent to the body to tell it what to do.

9-The way of the electrical impulse (Message form the surrounding) :



10-The brain can be process what we can see faster than what we can hear.

Unit (1)-Concept (3): Light & Sight



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موقع مذكرات جاهزة للطباعة

1-The eye is the organ responsible for the sense of sight.

2-Humans can't see in the dark, they need light to see. They need a night vision goggle to see in the dark.

3-Some nocturnal animals have a spectacular night vision through their structural adaptation in their eye which enable them to see at night.

4-

Animal	Structural adaptation
Fishing Cat	Wild cat hunts fish at night. Its eyes seem to glow in the dark They have a mirror like membrane on the back of their eyes "Tapetum lucidum".
Tarsier monkey	Lives in southeast Asia. It has huge eye like owls. It can't move its eye in their sockets الجفون. It can turn its head 180° like owls.

5-Light: It's a visible form of energy that travels in the form of waves (in straight lines).

6-Sources of light: It's something that emits its own light. (Sun - Candles - Electric lamp - fire)

7- Moon & Mirror aren't sources of light, because they don't emit light but they reflect the light fall on them.

8-How we see: We can see objects when light falls on them and bounces off to our eyes.

9- "Tapetum lucidum": It's a thin layer at the back of some animals' eyes that reflects light to allow them use very small amount of light in a highly effective way.

10- Light reflection: It's the bouncing back of light when it sticks a reflecting surface.

11-Types of reflecting surfaces:

1.Shiny & smooth materials (mirror - metal)

"reflect light better than other materials.

2.Rough materials (plastic - wood - cloth - paper)

"reflects light less than smooth materials.

12-Opaque objects: They are objects that don't allow light to pass through.

13- Transparent objects: They are objects that allow light to pass through.

14-The lens inside the eye focuses the light that falls on it onto the back of the eye and collects the light in a point, so you can see different objects.

15-Optometrist can test the eyes to determine whether the lens is focusing the light properly.

16-Optometrist Correct the vision by different ways such:

- Using glasses or contact lenses.
- Using laser surgery.



Concept (4): Communication and information transfer

1-Humans and animals use different ways to communicate with each other as sound, light, movement and scent.

2-

Living organism	Way of communication
Firefly beetles	They produce light - through chemical reaction - using their wings to warn off predators or to attract a mate.
Humpback whales	Sing under water in different tones : -In Winter: the songs of humpback whales have high-pitched sounds that travels better through cold water. -In summer: the songs have a low-pitched sounds that travels better through warm water.
Honeybees	They use a special dance to tell the bees in hive ^{خلية} where the food is.
Ants	They use the scent to communicate with each other when searching for food.
Humans	They communicate in different ways: - They use movements as sign languages or simple gestures. - They use sound when speaking to each other or sending a code. - They use Written and redden languages. ^{اللغات المقروءة والمكتوبة}

3-Ancient written languages:

- "Hieroglyphics" created by ancient Egyptians. It made up of 700 symbols.
- "Cuneiform drawings" created by Babylonians in Iraq.
- "hieroglyphs" created by Mayans in central America. Included 800 symbols.

4-Code: It's information that transformed into another representative form.

5-Types of codes: 1-languages. 2-Writing 3-Music or sound 4-light (flashes)

6-Morse code: It's a simple code consists of short beeps known as dots and long beeps known as dashes.

7-Communication system: It's a group of related objects that work together to send and receive information.

8-The electronic devices work to transfer information when they connect with : satellites, communication tours and software.

9- **Ants Communication system:** - Nurse ants send a strong smelly message to scout ants, which is responsible for searching food.

- When scout ants found the food, they send a strong smelly message to alert the ants where the food is.

10- Scientists create a special cane that emits a high-pitched sound just like bats do, to help blind people detect their surroundings.

Revision

UNIT (2): MOTION

Concept (1): Starting and Stopping

Concept (2): Energy and motion

Concept (3): Speed

Concept (4): Energy and collision

By: Amany Mahmoud Ghanem

Unit (2) - Concept (1): starting and stopping

- 1- There are **two forces** that cause the objects to move which are: **pulling force & pushing force**.
- 2- **Shockwave truck** is five times faster than the normal truck because it has been fitted with three jet engines.
- 3- Air or wind can move objects as the leaves on tree move by the wind blowing.
- 4- when some engineers fix the fire extinguisher طفايات الحريق onto a cart عربة صغيرة, then releases air from fire extinguishers, the air makes the cart begins to move forward.
- 5- If **balanced forces** قوى متزنة act on an object, it will not move.
- 6- If **unbalanced forces** قوى غير متزنة act on an object, it will move toward the greater force.
- 7- **Motion**: It's any change in the position of an object relative to a fixed point.
- 8- **Gravity**: It's a force that pulls objects toward the center of the earth.
- 9- **Force**: It's the pull or push that is applied to an object causes it to change its position.
- 10- **Moving object only stops when a force of the same amount is applied to it in the opposite direction of its motion**. الجسم المتحرك يتوقف عندما تؤثر عليه قوة لها نفس مقدار القوة المسببة لحركته في الاتجاه المعاكس لاتجاه حركته.
- 11- **Friction**: It's a force that is exerted القوة المبذولة when objects rub againstا each other.
- 12- Friction force always **slows down or stops motion** of moving objects.
- 13- The **direction of friction force** is always **opposite to the direction of motion** of a moving object.
- 14- Launching a satellite:
 - **Before launch**: It stays still because the forces acting on it are **balanced**.
 - **During Launch**: It moves away from Earth due to the **unbalanced forces** that act on.
 - **In space**: a satellite can keep travelling at the same speed for hundreds of years because in space there is no air, so there is no friction force to slow down the satellite.
- 15- Hard push causes object to travel along distance.
- 16- Gentle push causes object to travel a small distance.
- 17- Force transfers energy from one object to another.
- 18- Force is the effect that changes energy in a way that is makes this energy has the ability to do work, so the work done is equal to the amount of energy transferred by a force that is used to move an object.



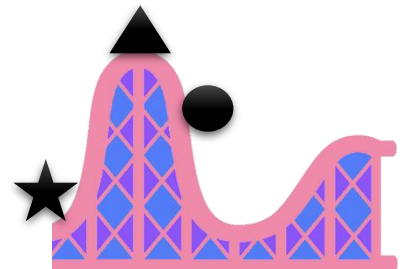
Unit (2) - Concept (2): Energy & Motion

- 1- **Energy**: It's the ability to do work or make a change.
- 2- **Work**: It's a force that causes an object to move distance.
- 3- **Forms of energy**: [Mechanical energy - Chemical energy - Thermal energy - Light energy - Electrical energy - Sound energy].
- 4- **Kinetic energy**: It's the energy of an object due to its motion.
 - It's forms: (Sound - Light - Thermal - Electrical) Energy.
- 5- **Potential energy**: It's the amount of energy that stored in an object due to its position.
 - It's forms: (Gravitational - Chemical - Elastic)
 - It depends on: 1. The mass of the object.
2. How High from earth's surface.
- 6- Energy can be stored and changed form one form to another form.
- 7- Energy can't be created nor destroyed but it changes from one form to another form.

8- Changing (and transformation) of energy at somethings' motion:

[A] Roller Coaster:

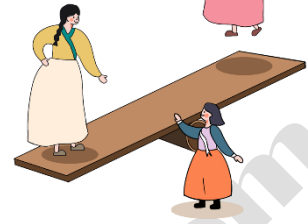
- **Electric energy**: that is used to operate the motor the pushes the roller coaster.
- ★ - **Kinetic energy**: while the roller coaster going up and it **decreases**.
- ▲ - **Potential energy**: it increases during going up and become **most at the top**.
- - **Kinetic energy**: while the roller coaster going down it **increases** and reaches most at the bottom.



[B] Football player:

- **Kinetic energy** transfer from the football player to the ball.
- Ball is moved by kinetic energy through the air.
- Kinetic energy transfer from the ball to the net causes it to vibrate

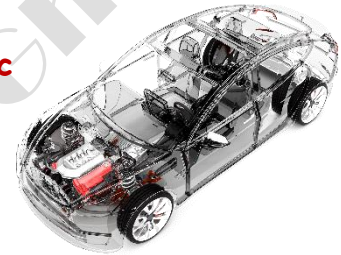


**[C] Acrobat on seesaw:**

- when acrobat (1) is on the tower it has **potential energy**.
- when acrobat (1) jump on the seesaw potetial energy is converted into **kinetic energy**.
- Kinetic energy is **trasfered to** acrobat (2) who stand on the seesaw.
- Kinetic energy is converted into **potential energy** gradually during the movement of acrobat (2) up in the air.

[D] Car's internal combustion engines:

- **Chemical potential energy** from the gasoline is converted into **kinetic energy** when it burned.
- **Kinetic energy** causes the car to move.

**[E] Skater during skating on the ice:**

- At the beginning of skating: **Chemical potential energy** is converted into **Kinetic energy**.
- when he starts jumping: **Kinetic energy** is converted gradually into **potential energy**.
- At the top of the jump (Highest Point in the air): all energy becomes **potential energy**.
- During moving down again: **potential energy** is converted into **kinetic energy** again.





Unit (2) - Concept (3): Speed

1- Speed: It's the distance travelled by the object in certain amount of time.

2- $\text{Speed} = \text{Distance} \div \text{Time}$

3- **Measuring units of speed:** Meters per second (m/sec)

Kilometer per hour (km/h or kph)

4- **Basics of speed:**

- It's a measurement of how fast is the moving object.
- It measures the distance overtime.
- It doesn't affect by **the direction** of the motion of the object.

5- We can affect on the speed of the moving object by increasing or reducing the force acts on it.

6- During moving down from **a ramp** with the same amount of force: - **the speed increases as the mass of the object increases because the kinetic energy increases.**

7- The object that travels **the greater distance** in the same amount of time is moving at **a greater speed.**

8- Speed and Kinetic energy increase as the angle of the incline increases.

9- **Cheetah:** is the fastest animal on the planet, because:

- **Head:** is low to shoulder, which decreases the air resistance.
- **Nose:** has large openings which help it breath a lot of air.
- **Heart:** large oversized powerful
- **Claws:** It stick to the ground while running to push off the ground, which makes it faster.
- **Spine (backbone):** flexible and acts like a spring for its leg muscles.
- **Body: lightweight:** average weight of male 41 - 45 Kg.

10- Most cars are powered by gasoline that pollute the air and causes climate change, while electric vehicles have batteries that must be charged from time to time.

11- Mechanical engineers design vehicles that are powered by the sun (**Solar energy**).

Advantages	Disadvantages
<ul style="list-style-type: none">- Don't need gasoline- Don't need to be charged- Don't cause climate change	<ul style="list-style-type: none">- Amount of energy that we get from the sun is very small.

12- Advantage and disadvantage of using solar vehicles:

13- The solar vehicle is so lightweight, because engineers remove most devices from the car such as "speedometer" that shows the drivers the car speed.

Unit (2) - Concept (4): Energy & Collision

1-The **faster and heavier** object that **has more energy causes more damage** than that the slower and **lighter object that has less energy**.

2- The objects that are in motion stay in motion until something stops them.

3- **Collision**: It's the moment where two objects hit or make contact in a forceful way.

4-The effect of speed on collision:

Fast-moving object	Slow-moving object
- It has more energy.	- It has less energy.
- When hit another object, it exerts more force .	- when hit another object, it exerts less force .
- This force causes a big damage to the object that can't be repaired .	- This force causes less damage to this object than the fast-moving object .

5- As the **Kinetic energy** of a moving object **increases during collision**, more damage will happen to this object.

6- A **large-mass vehicle causes more damage when it hits something than a small-mass vehicle traveling at the same speed**.

7- The speed of moving object on a ramp increases by increasing its mass.

8- The Kinetic energy of moving object down a ramp increasing by:

- Increasing its mass
- Increasing the angle of the ramp.

9- By increasing the force, mass and speed of an object, its kinetic energy increases.

10- Some of Kinetic energy changes into other forms of energy such as sound energy and thermal energy.

11- **Safety equipment** used in cars during collision:

- a. **Seatbelts**: Keep the driver's body and passengers from moving forward when the car stops suddenly.
- b. **Airbags**: slow the speed of the driver moving forward and absorb the energy of the car due to collision.

12- Crash investigator tasks are:

- a. Take measurements from the scene of the accident.
- b. Collecting data.



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